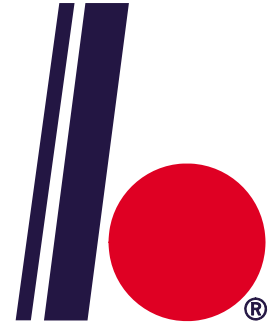


BERCHTOLD



Operating manual

Single and combination lights
CHROMOPHARE® E 778, E 668, E 558



Read the instructions before beginning any work.

OPERATING MANUAL

Related Publications:

Pre-Installation Manual 700000162

Service Manual TBD

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1 General

1.1 About This Operating Manual

This operating manual provides important instructions on how to handle the device. For safe operation, observe all safety and operating instructions.

Local accident prevention and general safety regulations also apply.

Read the operating manual thoroughly before beginning any work. The manual is considered part of the product and must be kept in the vicinity of the device at all times for reference by personnel.

If the device is transferred, the operating manual must be included.

The illustrations in this manual are intended to provide a better understanding of the device; they are not necessarily drawn to scale and may deviate slightly from the actual model.

1.2 Definition Of Symbols Used

Warnings

Symbols are used to indicate warnings in this manual. A signal word that reflects the extent of the danger precedes each warning.

Observe all warning notices and exercise extreme caution to prevent accidents, injuries and property damage.



DANGER!

Indicates an immediately dangerous situation that, if not avoided, will result in death or serious bodily injury.



WARNING!

Indicates a possibly dangerous situation that, if not avoided, can result in death or serious bodily injury.



CAUTION!

Indicates a possibly dangerous situation that, if not avoided, can result in moderate or minor injuries.



CAUTION!

Indicates a possibly dangerous situation that, if not avoided, can result in damage to property.

Tips and recommendations



NOTE!

Highlights useful tips, recommendations and information for efficient and trouble-free operation.

Special safety notices

To draw attention to particular dangers, the following symbol is used in combination with safety notices:



DANGER!

Risk of death from electrical current!

Indicates life-threatening situations resulting from electrical current. Disregarding the safety notice can result in serious injury or death.

Work may be performed by electrical technicians only.

1.3 Limited Liability

All specifications and notices in this manual were compiled using applicable standards and regulations, the current state of technology and our many years of experience and knowledge. The manufacturer assumes no liability for damages resulting from

- Non-compliance with the operating instructions.
- Improper operation.
- Work performed by untrained personnel.
- Unauthorized modifications.
- Technical changes.
- Installation of non-approved spare parts.
- Performance of unauthorized installation and maintenance work.

Explanations and illustrations presented herein may deviate from the actual product delivered in the case of special models, additional options or the latest technical changes. Furthermore, all obligations agreed to in the delivery contract, the general terms and conditions, the manufacturer's delivery terms, and any regulations legally valid at the time the contract is concluded apply.

We reserve the right to make technical modifications to improve and further develop the product.

1.4 Copyright protection

The operating manual should be treated as confidential. It is exclusively for the use of persons handling the device. The operating manual may not be transferred to third parties without written approval from BERCHTOLD.



NOTE!

The specifications, text, drawings, pictures and other illustrations contained herein are protected by copyright and are subject to industrial property rights. Improper application is punishable by law.

Making photocopies of any type or form, including excerpts hereof, as well as using and/or sharing the content of this manual requires written consent from BERCHTOLD. Violators will be liable for damages. Further claims remain reserved.

1.5 Consumables



WARNING!

Risk of injury if incorrect consumables used.

Incorrect or defective consumables can cause damage, malfunction or complete failure of the product and compromise safety.

Therefore:

- Use only original BERCHTOLD parts.

Purchase consumables from authorized dealers or directly from BERCHTOLD (address ⇒ back of manual).

1.6 Warranty Provisions

The warranty provisions and general terms and conditions can be found on and downloaded from the Internet (⇒ back of manual).

1.7 Customer Service

For technical questions, contact the BERCHTOLD Technical Service. (1-800-243-5135 Option 2)

To find out who your contact is, call, fax, e-mail or contact us via the Website at any time (⇒ back of manual).

1.8 Regulatory

The device has FDA 510K approval.

The device is UL listed

The device meets the requirements of the EU directive on medical products 93/42/EEG.

You will find the CE mark on the model plate (⇒ serial tag).

2 Safety

This section provides an overview of all important safety information for optimal protection of personnel and safe and trouble-free operation.

Non-compliance with the operating and safety instructions in this manual can result in considerable danger.

2.1 Responsibility Of The Operator

The device is used in a commercial space. Therefore, the operator of the device is subject to legal workplace safety regulations.

In addition to the occupational safety warnings presented in this manual, the operator must observe all the safety, accident-prevention and environmental protection regulations related to the field of application. In particular, the following apply:

- The operator must familiarize him- or herself with the valid occupational safety regulations and identify by means of a risk assessment any additional risks that result from the specific working conditions where the device is used. Such risks must be presented in the form of operating instructions.
- For the entire duration of device use, the operator must verify that the operating instructions created comply with current regulations and modify them if necessary.
- The operator must control and define clearly the responsibilities for installing, operating, maintaining and cleaning the device.
- The operator must ensure that all employees who handle the device have read and understood the operating manual.
- Furthermore, the operator must periodically train personnel and review the dangers.
- The operator must provide personnel with the required protective equipment.

The operator is also responsible for keeping the device in proper technical working order; the following apply:

- The operator must adhere to the maintenance intervals (Maintenance Schedule) specified in this manual.
- The operator must have all safety facilities checked regularly for proper function and completeness.

2.2 Personnel Requirements



WARNING!

Risk of injury if operated by insufficiently trained personnel!
Incorrect handling can result in serious bodily injury and property damage.

Therefore:

All activities are to be carried out only by qualified personnel.
Consult the manufacturer if there is any doubt concerning maintenance activities.
Repairs should be performed only by the manufacturer or authorized technical personnel.

The following qualifications apply for these various ranges of tasks:

- Medical specialists (surgeons, surgical personnel)
Are able to safely perform the assigned tasks by virtue of their medical education, knowledge and experience.
Medical specialists can independently detect, assess and avoid possible hazards to themselves or the patients.
Medical specialists understand all valid regulations, guidelines and standards required by law for safe use of the device and are able to implement them accordingly.
Medical specialists have the required technical knowledge for properly using the device in the area of application and comply with all hygiene regulations for rooms used for medical purposes and for the use of medical devices.
- Installation personnel
- Only BERCHTOLD employees or companies authorized by BERCHTOLD may install and perform the initial start-up of the product. Due to the heavy weight and high torque involved, only appropriately trained and experienced technicians may install surgical lighting.
- A skilled electrician,
Based on his or her training, skills and experience and well as knowledge of relevant standards and regulations is able to work on electrical systems and can independently detect and avoid possible dangers.
A skilled electrician is trained for the specific installation site and knows the relevant standards and regulations.

2.3 Intended Use

The device is designed and constructed exclusively for the use as described herein.

CHROMOPHARE® surgical lights are medical lights for use in hospital treatment rooms. They provide localized lighting focused on the patient's body for detecting and treating disease, injury, and disability. Surgical lights may be used only in rooms used for medical purposes and that have been constructed in accordance with regulations VDE 0100-710 or IEC 60364-7-10.



WARNING!

Danger if not used as intended!

Dangerous situations can result any time the device is used for purposes beyond or other than those intended.

Therefore:

- Use the device only as intended.
- Strictly adhere to all specifications in this operating manual.
- Only BERCHTOLD personnel or technicians expressly authorized by BERCHTOLD may install, modify or repair the devices.

The following uses are prohibited, in particular:

- Operation in areas where there is danger of explosion. The surgical lights are a potential source of ignition.
- Operation with a damaged under glass or filter system.
- Placement of objects on the light head or hanging objects from the swivel arms and light head.

Claims of any kind due to damage resulting from improper use are excluded. The operator is solely responsible for damages resulting from improper use.

2.4 FDA Approved Indications For Use

The surgical lights BERCHTOLD CHROMOPHARE® E558, E668, and E778 are intended to illuminate locally the operating site on the patient's body with a high intensity, shadow free, "cold" light.

Prescription Use Only (Part 21 CFR 801 Subpart D)

2.5 Reliability

As single lights, CHROMOPHARE® surgical lights provide a high degree of reliability because the individual LED modules are controlled separately from one another and the LED modules as well as their emitters have a long service life. Additionally, the light head is highly reliable because of the number of LEDs used.

If individual LEDs fail, the function of the light head is not compromised. If individual LED modules fail, the intensity is reduced.

Do not use single lights for operations during which a failure could seriously endanger the patient.

Light combinations with two or even three light heads provide greater security against light failure and provide better illumination of the surgical field. They provide light from various angles and maximum protection against failure through double and triple redundancy. This is particularly true if they are connected to an emergency power supply in addition to the mains supply. These types of combination lights may be used in all medical disciplines for lighting surgical areas.

2.6 Personal Protective Equipment

To minimize health risks, personal protective equipment must be worn while working.

- Always wear the required protective equipment for the given task.
- Observe instructions posted in the work area regarding personal protective equipment.

Protective equipment for special tasks



Certain tasks require special protective equipment. These tasks are discussed individually in the various sections of this manual. The special protective equipment covered is:

Safety goggles

Protect the eyes from projectile objects and fluids.

2.7 Specific Risks

The following section lists residual risks identified by a risk analysis.

- Be sure to observe the safety instructions and warning notices provided in the later sections of this manual to reduce health risks and avoid dangerous situations.

Electrical current



DANGER!

Risk of death from electrical current!

Touching live electrical components is life threatening. Damage to insulation or individual components can cause fatal injury.

Therefore:

If insulation is damaged, immediately switch off power supply and initiate repairs.

Electrical work is to be performed by skilled electricians only.

To perform any electrical work, disconnect the unit from the power supply and verify that it is dead.

Before performing any maintenance, cleaning or repairs, switch off the power supply and ensure it cannot be accidentally switched on.

Do not bypass or deactivate fuses. Make sure the amperage is correct when changing fuses.

Keep conductive parts away from humidity.

It can cause a short circuit.

EMC risks (flat screens)



WARNING!

Use of non-EMC flat screens and switched-mode power supplies is life threatening.

Radiation disturbances can skew measurement results of medical devices (e.g., monitoring of vital functions). This can result in life-threatening situations.

Therefore:

Use only UL- or IEC-rated (UL60601-1, IEC 60601-1) flat screens and switched-mode power supplies.

2.8 Environmental Protection



CAUTION!

Environmental hazard from incorrect handling!

Incorrect handling of environmentally hazardous substances, especially incorrect disposal, can result in significant damage to the environment.

Therefore:

Always observe the following instructions.
Take appropriate measures immediately should hazardous substances accidentally be released into the environment. In case of doubt, notify the responsible local authorities regarding the damage.

The following environmentally hazardous substances are used:

Lubricants

Lubricants such as grease and oil contain poisonous substances. They should not be released into the environment. Disposal must be handled by disposal specialists.

2.9 Labeling



Hot surface (on the lighting system)

Hot surfaces are not always obvious.
Allow to cool before handling.



Electrical current (on the soffit)

Only skilled electricians may work in these areas.

3 Technical Data

3 Technical Data

3.1 General Information

The cardanic suspension of CHROMOPHARE® surgical lights are available in a number of models.

- Classic cardanic (A.C.) for normal ceiling heights.
- Shortened classic cardanic (sA.C.) for medium-high to low ceiling heights.
- Flat cardanic (N.C.) for low ceiling heights.

Features in the following tables are marked "A.C.," "sA.C." or "N.C.," as appropriate.

The weights and maximum torques are specific to single lights (including transformer and anchor plate), each with a 180-mm ceiling tube and a 900-mm cantilever (Ø 125 mm).

CHROMOPHARE® E 778

Specifications	Value	Unit
Weight incl. transformer	154 / 70	Lbs / Kg
Max. torque	391.65 / 531	ft-lb/Nm
Light head diameter	31.2 / 78	in / cm
Light emission surface area	574.4 / 3590	in ² / cm ²
Max. swivel radius	94.2 / 235.5	in / cm
Lowest position of light head (N.C.)	52 / 130	in / cm
Highest position of light head (N.C.)	91.6 / 229	in / cm
Lowest position of light head (sA.C.)	40.8 / 102	in / cm
Highest position of light head (sA.C.)	86.4 / 216	in / cm
Lowest position of light head (A.C.)	37.24 / 93.1	in / cm
Highest position of light head (A.C.)	86.6 / 216.5	in / cm
Clearance, single light (N.C.) (with a 245.5-cm ceiling height)	78.7 / 200	in / cm

Technical Data

CHROMOPHARE® E 668

Specifications	Value	Unit
Weight incl. transformer	132 / 60	Lbs / Kg
Max. torque	365.09 / 495	ft-lb/Nm
Light head diameter	25.6 / 64	in / cm
Light emission surface area	376.32 / 2352	in ² / cm ²
Max. swivel radius	93.2 / 233	in / cm
Lowest position of light head (N.C.)	51.4 / 128.5	in / cm
Highest position of light head (N.C.)	91.2 / 228	in / cm
Lowest position of light head (A.C.)	46 / 115	in / cm
Highest position of light head (A.C.)	88 / 220	in / cm
Clearance, single light (N.C.) (with a 245.5-cm ceiling height)	78.7 / 200	in / cm

CHROMOPHARE® E 558

Specifications	Value	Unit
Weight incl. transformer	143 / 65	lbs / kg
Max. torque	328.22 / 445	ft-lb/Nm
Light head diameter	23.2 / 58	in / cm
Light emission surface area	282.56 / 1766	In ² / cm ²
Max. swivel radius	93 / 232.5	in / cm
Lowest position of light head (N.C.)	51.4 / 128.5	in / cm
Highest position of light head (N.C.)	91.6 / 229	in / cm
Lowest position of light head (A.C.)	40.8 / 102	in / cm
Highest position of light head (A.C.)	86.4 / 216	in / cm
Clearance, single light (N.C.) (with a 245.5-cm ceiling height)	78.7 / 200	in / cm

3.2 Connection Loads

CHROMOPHARE® E 778

Specifications	Value	Unit
Transformer primary voltage	100/120/127	V (AC)
	220/230/240	V (AC)
Power consumption at mains during mains operation	300	VA (AC)
Power consumption at mains with DC supply	200	VA (at 24-28 V DC)
AC frequency	50/60	Hz
Safety class	1	
Emitter Service Life	5000	hrs

Technical Data

CHROMOPHARE® E 668

Specifications	Value	Unit
Transformer primary voltage	100/120/127	V (AC)
	220/230/240	V (AC)
Power consumption at mains during mains operation	250	VA (AC)
Power consumption at mains with DC supply	160	VA (at 24-28 V DC)
AC frequency	50/60	Hz
Safety class	1	
Emitter Service Life	5000	hrs

CHROMOPHARE® E 558

Specifications	Value	Unit
Transformer primary voltage	100/120/127	V (AC)
	220/230/240	V (AC)
Power consumption at mains during mains operation	220	VA (AC)
Power consumption at mains with DC supply	140	VA (at 24-28 V DC)
AC frequency	50/60	Hz
Safety class	1	
Emitter Service Life	5000	hrs

LED emitters
CHROMOPHARE® E 778, E 668, and
E 558

The CHROMOPHARE® E 778, E 668, and E 558 surgical lights are equipped with an innovative light source, the LED ("light-emitting diode").

In contrast to traditional halogen or high-intensity discharge lamps, LEDs are characterized by a very long service life.

As a rule, traditional bulbs must be replaced after 1,000 to 5,000 hours of operation, while LEDs have a longer service life of at least 25,000 hours of operation.

The CHROMOPHARE® E 778 consists of a total of 14 LED modules respectively 168 LEDs. The modules vary in size and shape as follows:

- 10 hexagonal modules
- 4 semi-circular modules

The CHROMOPHARE® E 558 consists of a total of 6 hexagonal LED modules, respectively 72 LEDs.

The modules as such consist of 12 warm- and cool-white LEDs. Additionally, all the modules are controlled individually (CAN interface) for simplified service.

The CHROMOPHARE® E 668 consists of a total of 68 hexagonal LED modules, respectively 96 LEDs.

The modules as such consist of 12 warm- and cool-white LEDs. Additionally, all the modules are controlled individually (CAN interface) for simplified service.

3.3 Operating Conditions

All models

Specifications	Value	Unit
Ambient temperature	50...107	°F
	10...40	°C
Relative humidity, non-condensing	30...75	%
Barometric pressure	10.14..15.4	PSI
	700...1060	hPa

3.4 Performance

The technical lighting data provided in the following tables has a tolerance of $\pm 10\%$.

Technical Data

CHROMOPHARE® E 778

Specifications	Value	Unit
Color temperature levels (only with Color Select option)	3600, 4000 4500, 5000	K K
Standard color temperature level (without Color Select option)	4500	K
Intensity Ec at 1 m	160	klx
Electronic brightness control	80– 160	klx
Total radiant power at max. intensity	600	W/m ²
Total radiant power/intensity	3.7	mW/ (m ² lx)
Color rendering index R _a	94	
Circadian effect coefficient a _{cv}	0.72	
Light field diameter	6-11.6 15-29	in cm
d ₁₀ Light field, Ø at 10 % of max. intensity	6 / 15	in / cm
d ₅₀ Light field, Ø at 50 % of max. intensity	3.84 9.6	in cm
Residual brightness when obstructed by one mask, with reference to Ec	73	%
Residual brightness when obstructed by two masks, with reference to Ec	52	%
Residual brightness in standardized tube, in reference to Ec	91	%
Residual brightness in standard tube with one shader, in relation to Ec	66	%
Residual brightness in standard tube with two shaders, in relation to Ec	47	%
Depth of illumination L1 + L2	30 / 75	in / cm

Technical Data

CHROMOPHARE® E 668

Specifications	Value	Unit
Color temperature levels (only with Color Select option)	3600	K
	4000	K
	4500	K
	5000	K
Standard color temperature level (without Color Select option)	4500	K
Intensity Ec at 1 m	160	klx
Electronic brightness control	80–160	klx
Total radiant power at max. intensity	600	W/m ²
Total radiant power/intensity	3.7	mW/ (m ² lx)
Color rendering index R _a	94	
Circadian effect coefficient a _{cv}	0.72	
Light field diameter	6-11.6	in
	15-29	cm
d ₁₀ Light field, Ø at 10 % of max. intensity	6 / 15	in / cm
d ₅₀ Light field, Ø at 50 % of max. intensity	3.84	in
	9.6	cm
Residual brightness when obstructed by one mask, with reference to Ec	56	%
Residual brightness when obstructed by two masks, with reference to Ec	46	%
Residual brightness in standardized tube, in reference to Ec	95	%
Residual brightness in standard tube with one shader, in relation to Ec	53	%
Residual brightness in standard tube with two shaders, in relation to Ec	44	%
Depth of illumination L1 + L2	34 / 85	in / cm

Technical Data

CHROMOPHARE® E 558

Specifications	Value	Unit
Color temperature levels (only with Color Select option)	3600 4000 4500 5000	K K K K
Standard color temperature level (without Color Select option)	4500	K
Intensity E_c at 1 m	120	klx
Electronic brightness control	60–120	klx
Total radiant power at max. intensity	440	W/m ²
Total radiant power/intensity	3.7	mW/ (m ² lx)
Color rendering index R_a	94	
Circadian effect coefficient a_{cv}	0.72	
Light field diameter	6-11.6 15-29	in cm
d_{10} Light field, Ø at 10 % of max. intensity	6 / 15	in / cm
d_{50} Light field, Ø at 50 % of max. intensity	3.84 9.6	in cm
Residual brightness when obstructed by one mask, with reference to E_c	56	%
Residual brightness when obstructed by two masks, with reference to E_c	46	%
Residual brightness in standardized tube, in reference to E_c	100	%
Residual brightness in standard tube with one shader, in relation to E_c	56	%
Residual brightness in standard tube with two shaders, in relation to E_c	46	%
Depth of illumination L1 + L2	34 / 85	in / cm

3.5 Emissions

A full explanation on compliance with EMC guidelines can be found in the appendix.

3.6 Serial Tag

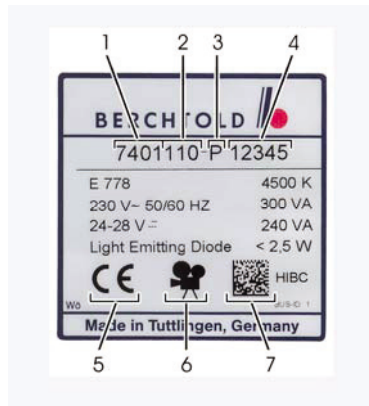


Fig. 1 Serial Tag

The serial tag is located next to the suspension installation point on the housing of the light head.

It contains the following information:

- 1** Version number
- 2** Model number
- 3** Year of manufacture (A = 1993, B = 1994, ...)
- 4** Sequential numbering
- 5** CE mark
- 6** Symbol for camera preparation (optional)
- 7** Health Industry Bar Code

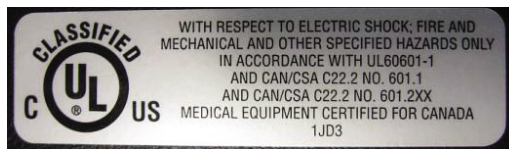


Fig. 2 UL Label

4 Design and function

4.1 Overview

Single Lights, Classic Cardanic

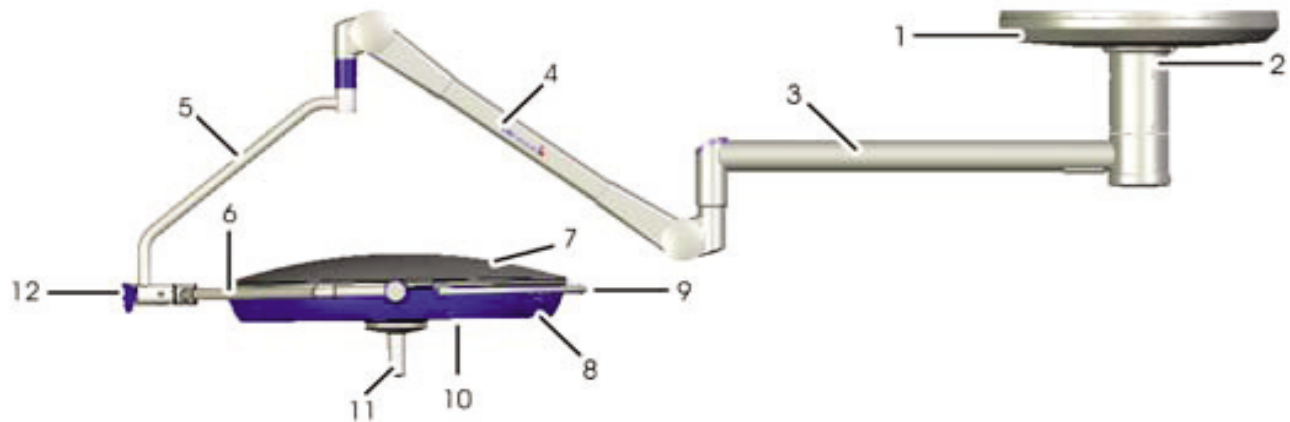


Fig. 3 CHROMOPHARE E 778, E 668, & E 558 single light components, classic cardanic (without height compensation tube)

- | | | | |
|---|--------------------------------------|----|--------------------|
| 1 | Soffit | 7 | Light dome |
| 2 | Flange tube Ø 125 mm | 8 | Light frame |
| 3 | Horizontal arm | 9 | Bail handle |
| 4 | Spring arm | 10 | Lens |
| 5 | Vertical articulation cardanic arm | 11 | Handle assembly |
| 6 | Horizontal articulation cardanic arm | 12 | Key pad (Optional) |

Single Lights, Flat Cardanic

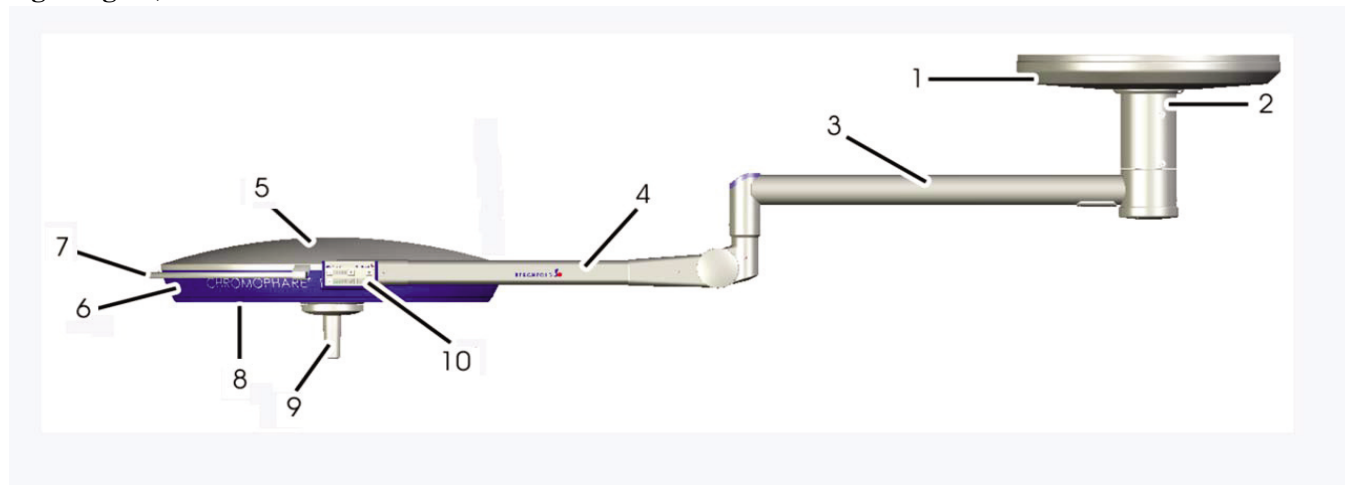


Fig. 4 CHROMOPHARE® E 778, E 668 and E 558 single light components, flat cardanic (without height compensation tube)

- | | | | |
|---|----------------------|----|-------------------|
| 1 | Soffit | 6 | Light frame |
| 2 | Flange tube Ø 125 mm | 7 | Bail handle |
| 3 | Horizontal arm | 8 | Lens |
| 4 | Spring arm | 9 | Handle assembly |
| 5 | Lamp dome | 10 | Keypad (optional) |

Light Combination, Classic Cardanic

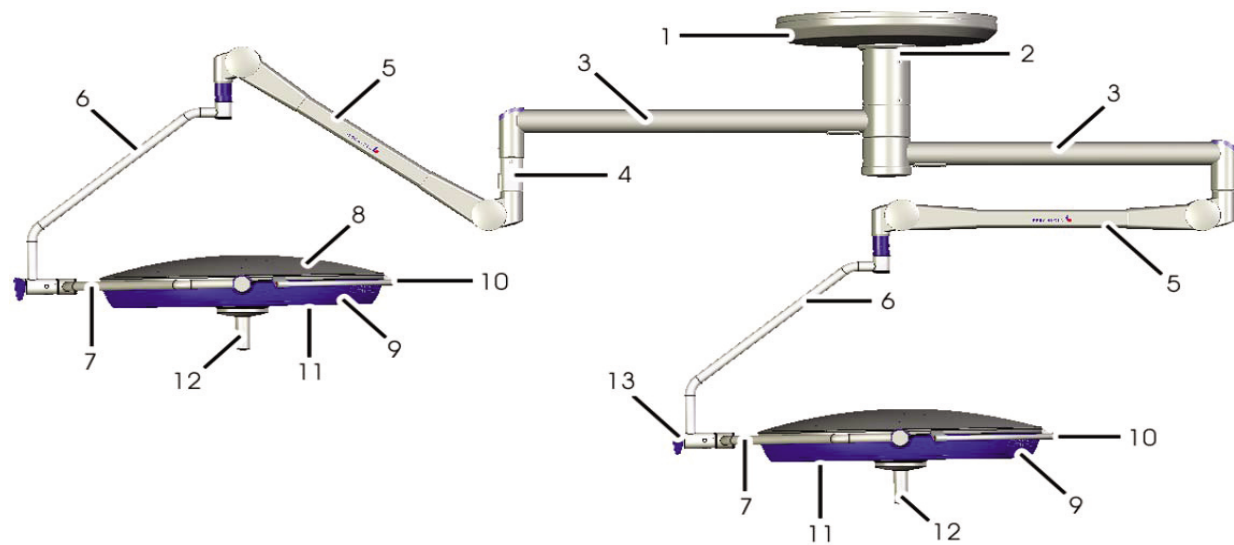


Fig. 5 CHROMOPHARE® E 778 with E 778 light combination components, classic cardanic

- | | | | |
|---|--------------------------------------|----|-------------------|
| 1 | Soffit | 8 | Light dome |
| 2 | Flange tube Ø 125 mm | 9 | Light frame |
| 3 | Horizontal arm | 10 | Bail Handle |
| 4 | Height compensation tube | 11 | Lens |
| 5 | Spring arm | 12 | Handle assembly |
| 6 | Vertical articulation cardanic arm | 13 | Keypad (optional) |
| 7 | Horizontal articulation cardanic arm | | |

Light Combination, Flat Cardanic (N.C.)

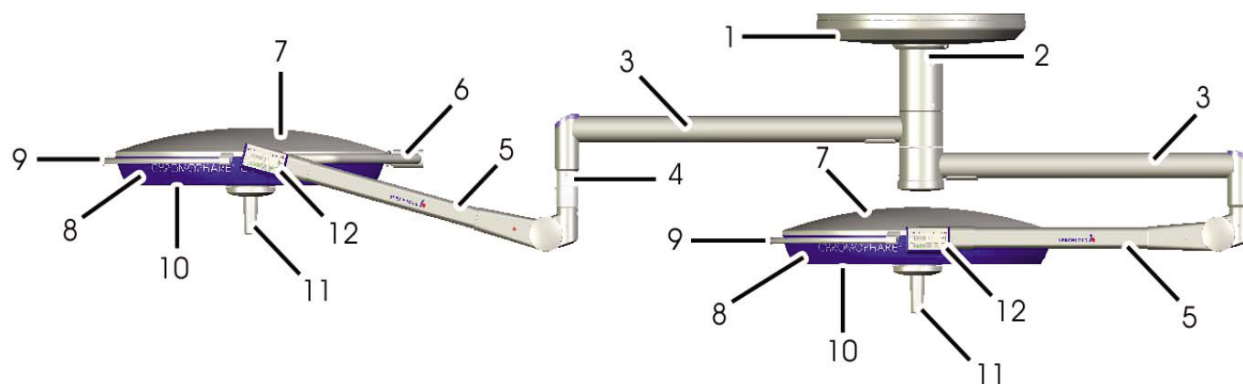


Fig. 6 CHROMOPHARE® E 778 with E 778 light combination components, flat cardanic

- | | |
|--|-----------------------|
| 1 Soffit | 7 Lamp dome |
| 2 Flange tube Ø 125 mm | 8 Light frame |
| 3 Horizontal arm | 9 Bail handle |
| 4 Height adjustment tube | 10 Lens |
| 5 Spring arm | 11 Handle assembly |
| 6 Horizontal articulation cardanic arm | 12 Key pad (optional) |

Handle Assembly



Fig. 7 Overview of handle assembly

- | | |
|---------|-----------------|
| 1 Focus | 2 Handle sleeve |
|---------|-----------------|



Single and combination lights CHROMOPHARE® E 778, E 668, E 558

Mechanical Adjustment

4.2 Brief Description

Suspension

The CHROMOPHARE® E 778, E 668 and E558 surgical lights consist of

- Ceiling tube
- Horizontal arm
 - Spring arm
 - Cardanic
- Light head

The light head is attached to a cardanic (vertical articulating joint, horizontal articulating joint) and can be rotated, swiveled and tilted in any direction.

The 360° rotatable horizontal arm/controls the spatial position of the light head.

The 360° rotatable spring arm is used to adjust the height.

Lamp top cover

The light head is made of an impact-resistant metal dome. It resists distortion and corrosion.

Light properties

LEDs emits only visible light, neither infrared not skin-irritating Ultraviolet radiation is present.

It ensures cool light at the surgical field and in the beam path of the surgical light.

The particular arrangement of the LED modules ensures especially good depth of illumination and low shadow levels.

Control panel

The control panel is located in a wall box. The membrane keypad is used to control the light functions.

The control panel can also be optionally installed at the lamp end of the vertical articulation joint or the spring arm.

Hygiene

The suspension system, the handle sleeve with the wide protective collar and the integrated release mechanism ensure that strict surgical hygiene requirements are met.

4.3 System Models

CHROMOPHARE® E-generation surgical lights can be obtained in the following models:



- CHROMOPHARE® E 778, E 668 and E 558 as single, double or triple light configurations.
- ChromoView™ monitor support arms, camera support arms and unit carriers are also available, separately or in combination with single or double light systems

4.4 Hazardous Areas



Fig. 8 Light exit hazard zone

Light exit hazard zone:

- Risk of glare from high light intensity
- Risk of skin irritation due to oversensitivity to light

Hazard zone around entire light head and all supporting arms:

- Risk of damage due to hard collisions

4.5 Scope Of Delivery

Every E-generation CHROMOPHARE® surgical light is delivered preassembled with all individual components (suspension, carrier arms, light head and options).

The delivery also contains the following accessories:

Quantity	Item	Part No.	Comment
1	Operating manual	57155	Current version, for all models
2	Standard handle sleeve	CZ 4990604	For all models
2	ChromoVision® handle sleeve	CZ 4990704	Only when ChromoVision® or HD camera system is selected as an option.

These consumables are available as options or spare parts (⇒ appendix).

5 Mechanical adjustments

5.1 Diagrams

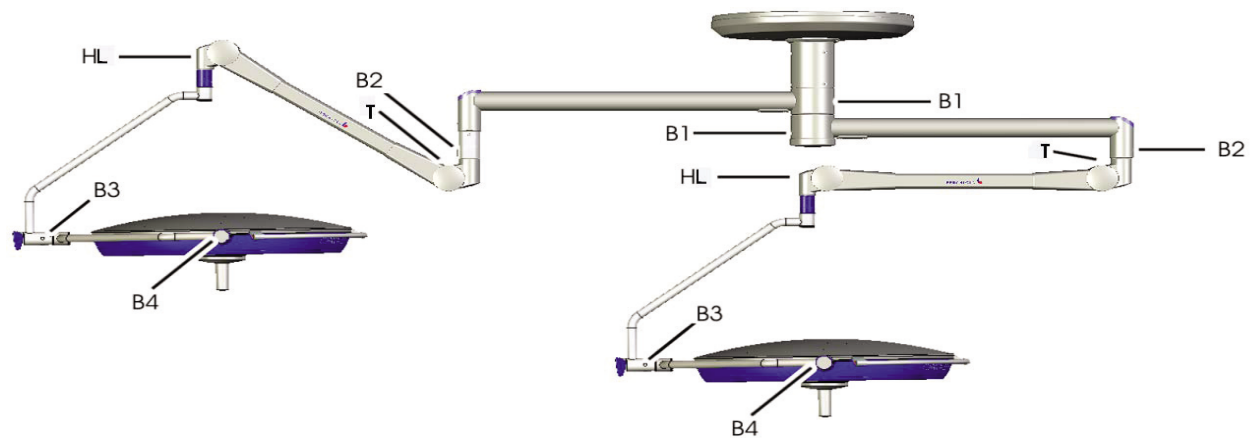


Fig. 9 Adjustment points, classic cardanic

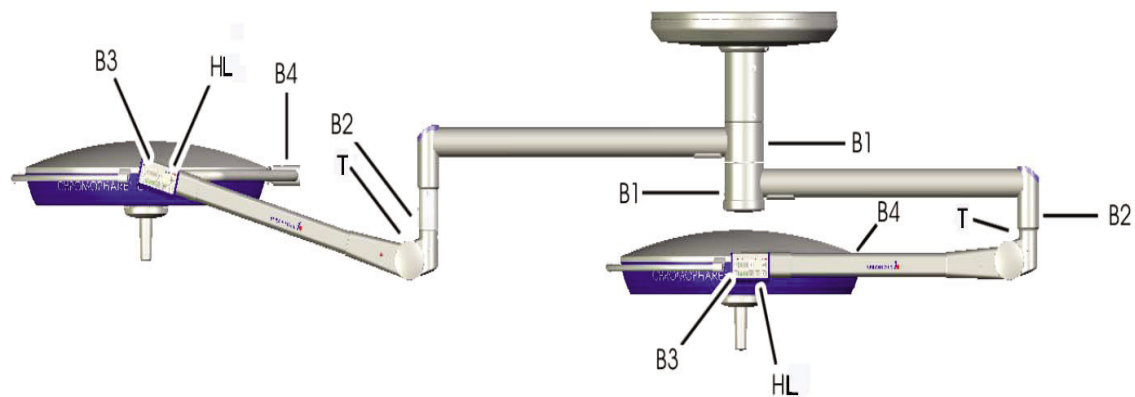


Fig. 10 Adjustment points, flat cardanic

Abbreviation	Adjustment element
B	Brake screw
T	Spring tension adjustment
HL	Height limit

5.2 Adjusting The Brakes



NOTE!

The following steps apply to spring arms mounted to a height adjustment tube as well as spring arms mounted directly to the swivel arm.

Adjust the braking action of the individual joints so that the light head stays in any given position. If the suspension arm of the surgical light drifts, tighten or replace the appropriate brake screw.

Use the brake screw (B1) to adjust the braking action to the rotation of the swivel arm/boom.

- Turn counterclockwise to decrease the braking action.
- Turn clockwise to increase the braking action.

Horizontal Arm Brakes

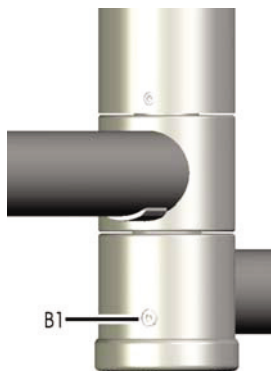


Fig. 11 Brake screw, B1

Spring Arm Brakes

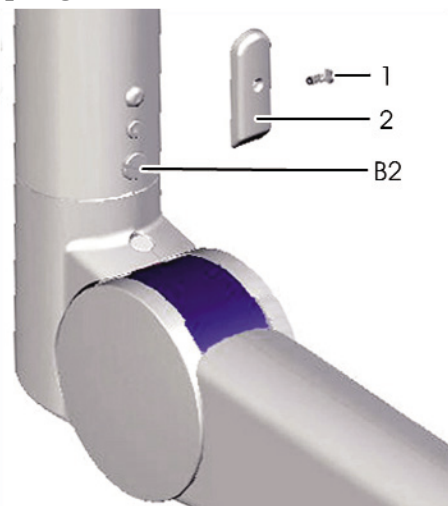


Fig. 12 Brake screw, B2

1. Loosen screw (1).
2. Remove the cover (2).
3. Use brake screw B2 to adjust the braking action to the rotation of the spring arm:
 - Turn counterclockwise to decrease the braking action.
 - Turn clockwise to increase the braking action.
4. To reattach the cover, perform steps 1-2 in reverse order.

Cardanic Joint Brakes (Classic Cardanic)

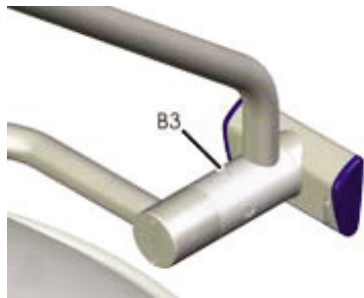


Fig. 13 Brake screw, B3 (A.C.)

Use the brake screw (B3) to adjust the braking action of the cardanic joint:

- Turn counterclockwise to decrease the braking action.
- Turn clockwise to increase the braking action.

Cardanic Joint Brakes (Flat Cardanic)

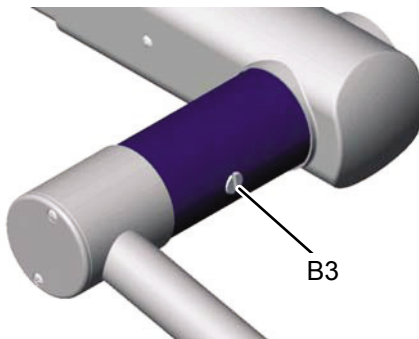


Fig. 14 Brake screw, B3 (N.C.)

Use the brake screw (B3) to adjust the braking action of the cardanic joint:

- Turn counterclockwise to decrease the braking action.
- Turn clockwise to increase the braking action.

Light Head Brakes

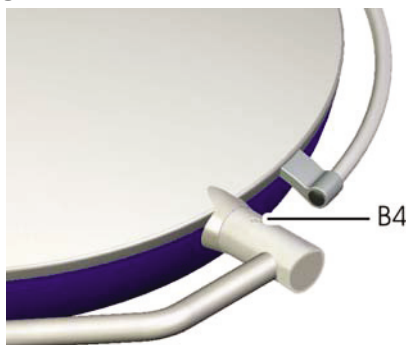


Fig. 15 Brake screw, B4

Use the brake screw (B4) to adjust the braking action to the rotation of the light head.

- Turn counterclockwise to decrease the braking action.
- Turn clockwise to increase the braking action.

5.3 Adjusting The Height Stop And Counterweight

Spring Arm Height Stop (Classic Cardanic)



NOTE!

For a low ceiling, you can adjust the spring arm height down to a horizontal position.



CAUTION!

Risk of injury from rapidly moving parts!

The spring arm is under a high level of tension. The spring arm can move erratically of its own accord and cause injury.

Therefore:

- Do not set the adjustment screw until assembly is complete.



Fig. 16 Adjustment screw, HL

1. Remove the end cap using a small screwdriver and dispose of cap if installed.
The HL adjustment screw for the height stop is beneath the end cap.
2. Put the spring arm in a horizontal position.
3. Use the HL adjustment screw to adjust the height limit:
 - Turn clockwise to reduce the height.
 - Turn counterclockwise to increase the height.

Spring Arm Height Stop (Flat Cardanic)

Special tools

■ Steel pin, \varnothing 4 mm

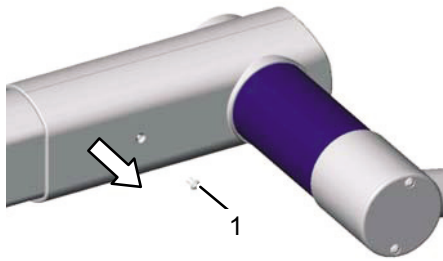


Fig. 17 Cover

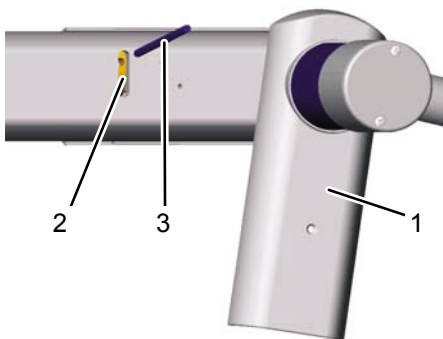


Fig. 18 Ring nut

1. Remove the mounting screw (1).
2. Pull off the cover in the direction of the arrow.
3. Turn the cover (1) down as pictured.
4. Position the spring arm so the ring nut (2) appears in the slit.
5. Use the steel pin (3) to rotate the ring nut until the desired height limit is reached:
 - Turn clockwise to reduce the height.
 - Turn counterclockwise to increase the height.
6. To reattach the cover, perform steps 1-4 in reverse order.

Spring Arm Tension

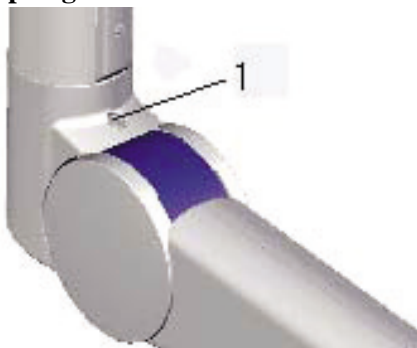


Fig. 19 Screw for adjusting spring tension

1. Put the spring arm into a position as close to horizontal as possible so that adjusting screw T (2) is easy to access with a ball-head Allen wrench.
2. Use adjustment screw T to adjust the spring tension:
 - Turn clockwise to increase the spring tension.
 - Turn counterclockwise to reduce the spring tension.

5.3.1 Mechanical Adjustments, Single-Monitor Support Arm

5.3.1.1 Spring Arm Tension

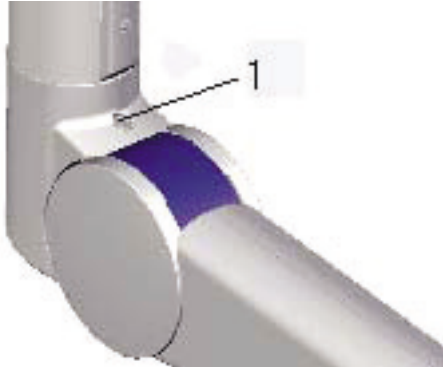


Fig. 20 Screw for adjusting spring tension

1. Put the spring arm into a position as close to horizontal as possible so that adjusting screw T (2) is easy to access with a ball-head Allen wrench.
2. Use adjustment screw F to adjust the spring tension:
 - Turn clockwise to increase the spring tension.
 - Turn counterclockwise to reduce the spring tension.

5.3.1.2 Spring Arm Height Limit



NOTE!

For a low ceiling, you can adjust the spring arm height down to a horizontal position.



CAUTION!

Risk of injury from rapidly moving parts!

The spring arm is under a high level of tension. The spring arm shanks can move erratically of their own accord and cause injury.

Therefore:

- Do not set the adjustment screw until assembly is complete.



Fig. 21 Adjustment screw, HL

1. Remove the end cap using a small screwdriver. The adjustment screw for the height stop is located under the end cap.
2. Put the spring arm into a position as close to horizontal as possible so that adjusting screw HL is easy to access with a ball-head Allen wrench.
3. Use the adjustment screw to adjust the height limit:
 - Turn clockwise to reduce the height.
 - Turn counterclockwise to increase the height.

5.3.1.3 Spring Arm Brake



NOTE!

The following steps apply to spring arms mounted to a height compensation tube as well as spring arms mounted directly to the horizontal arm.

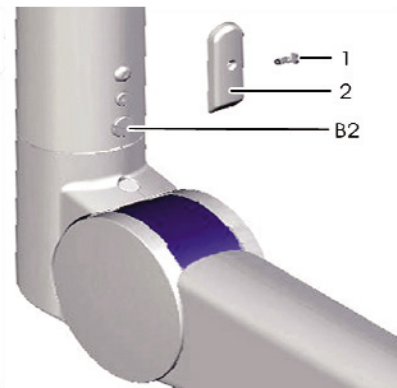


Fig. 22 Brake screw, B2

1. Loosen screw (1).
2. Remove the cover (2).
3. Use brake screw B2 to adjust the braking action to the rotation of the spring arm:
 - Turn clockwise to increase the braking action.
 - Turn counterclockwise to reduce the braking action.
4. To reattach the cover, perform steps 1-2 in reverse order.

5.3.1.4 Monitor Suspension Brake (Rotational Movement)

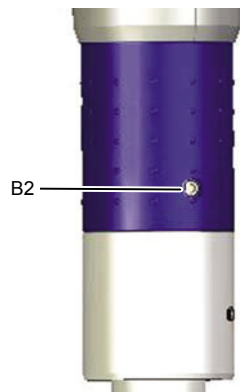


Fig. 23 Brake screw, B2

Use brake screw B2 to adjust the braking action to the rotation of the monitor suspension.

- Turn clockwise to increase the braking action.
- Turn counterclockwise to reduce the braking action.

5.3.1.5 Monitor Suspension Brake (Tilting Movement)



Fig. 24 Brake screw, B1

Brake for monitor suspension tilt:

Use brake screw B1 to adjust the tilting action of the monitor suspension:

- Turn clockwise to increase the braking action.
- Turn counterclockwise to reduce the braking action.

Mechanical Adjustments, Dual-Monitor Support Arms

5.3.1.6 Heavy-Duty Arm Spring Tension

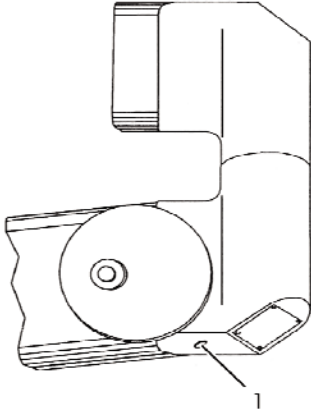


Fig. 25 Opening for making adjustments

1. Insert Allen wrench (size: 6 mm) into the adjustment opening (1).
2. Put the heavy-duty arm into a position as close to horizontal as possible so that the adjusting screw is easy to turn using the Allen wrench:
 - Turn clockwise to increase the spring tension.
 - Turn counterclockwise to reduce the spring tension.

5.3.1.7 Heavy Duty Spring Arm Height Adjustment

Special tools

- Snap bushing pliers for snap bushing



NOTE!

Do not adjust the height stop of the heavy-duty arm until weight is counterbalanced.

Mechanical Adjustment

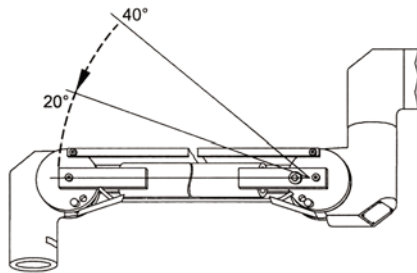


Fig. 26 Height stop 20°/40°

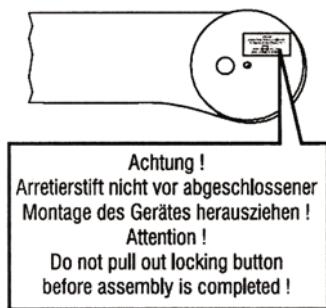


Fig. 27 Warning

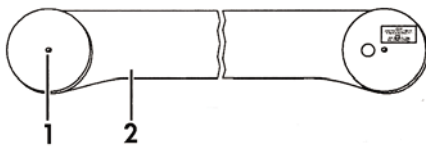


Fig. 28 Two cover sections

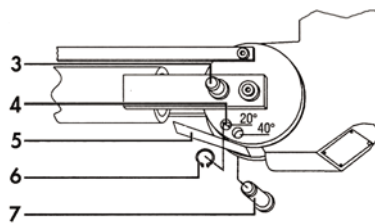


Fig. 29 Rotation stop

At delivery, the heavy-duty arm is set to a height stop of 40° above and below horizontal.

You can also set the height stop to 20°.



CAUTION!

Risk of injury from uncontrolled moving parts!

The heavy-duty arm is under high spring tension. The heavy-duty arm can move erratically of its own accord and cause injury.

Therefore:

- Note the warning notice on the spring arm (⇒ Warning).
- Do not set the locking pin until assembly is complete.

Unscrew the Phillips screws (1) and take the two cover sections apart (2).

Loosen locking pin (3).

Remove snap ring (6) with snap ring pliers.

Remove stop pin (7) from the hole marked "40°."

Insert stop pin in the hole marked "20°."

Secure the stop pin with the snap ring (6).

Verify that the snap ring is seated properly.

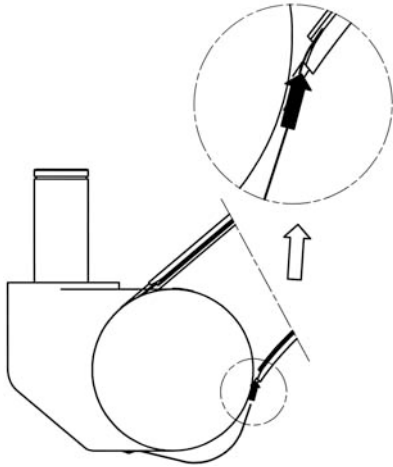


Fig. 30 Rear joint, cover straps

Move heavy-duty arm into the up position.
 Place the 147-mm cover strap on the rear joint in the bottom guide.
 Place the 130-mm cover strap on the front joint in the top guide.
 Lower the heavy-duty arm.
 Place the 130-mm cover strap on the back joint in the top guide.
 Place the 130-mm cover strap on the front joint in the bottom guide.
 Make sure that the cover straps are completely seated in the guides.
 (⇒ Fig. 1 Rear joint, cover straps.)
 Attach both sections of the cover with Phillips screws.
 Make sure the cover halves are secure.

5.3.1.8 Heavy Duty Brake Arm

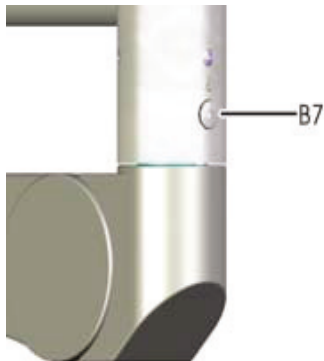


Fig. 31 Brake screw, B7

Use brake screw B7 to adjust the braking action to the rotation of the heavy-duty arm.

- Turn clockwise to increase the braking action.
- Turn counterclockwise to reduce the braking action.

5.3.1.9 Adjusting the Dual Monitor Bracket

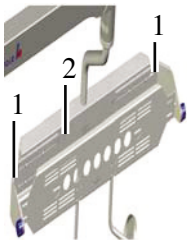


Fig. 32 Bracket

Adjust the side pieces of the flat screen bracket (1) to the width of the flat screens. Use the scale (2) on the cross member.

5.3.1.10 Suspension Brake, Dual Monitor (Rotational Movement)

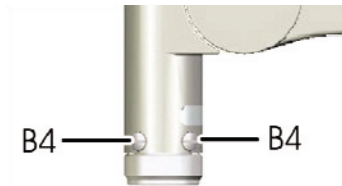


Fig. 33 Brake screw, B4

Use brake screws B4 to adjust the braking action to the rotation of the cross connector.

- Turn clockwise to increase the braking action.
- Turn counterclockwise to reduce the braking action.

5.3.1.11 Brake for Dual Monitor Suspension (Tilting Movement)

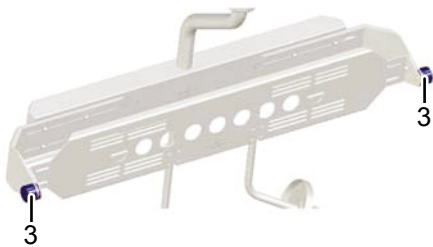


Fig. 34 Set screws

Use the set screws (3) to adjust the tilting action of the monitor suspension:

- Turn clockwise to increase the braking action.
- Turn counterclockwise to reduce the braking action.



NOTE!

If monitor cannot be adjusted to the desired angle, have the technician ensure that the monitor is mounted on the correct VESA mounting screws that provide central weight distribution for the installed monitor.

Setting the Rotation Stop and Limiting Swivel Range

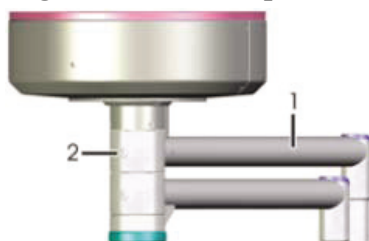


Fig. 35 Outer stop screw



Fig. 36 Inner stop screw



Fig. 37 Setting the rotation stop



Fig. 38 Outer stop screw

1. Turn the swivel arm (1) to the end stop.
2. Remove outer stop screw (2) using an Allen wrench (size 6).

3. Turn the swivel arm until you can see the inner stop screw (3).
4. Remove the inner stop screw as well.

5. Turn swivel arm to the desired position
6. Reinsert the stop screw you just removed into the corresponding visible thread (4) and tighten.



NOTE!

The stops can be set in 30° increments.



CAUTION!

Damage to cabling possible!

At least one rotated stop must be present on the monitor arm.

7. Turn the swivel arm until the inner stop screw is no longer visible.
8. Screw the outer stop screw (5) back in.



NOTE!

There are two stop screws for limiting the swivel range. Repeat steps 3-6.

5.3.2 Cable Connection Box

The following instructions apply to both versions of the cable box:

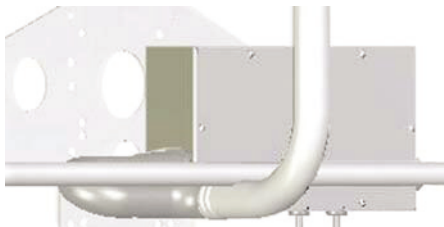


Fig. 39 Cable box for single-monitor suspension

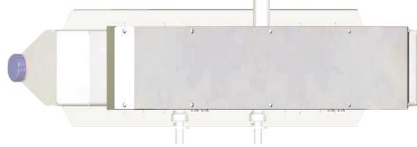


Fig. 40 Cable box for dual-monitor suspension



CAUTION!

There is a risk of burning due to high surface temperatures when the power consumption of the switched-mode power supply is too high!

If the power consumption of the switched-mode power supply installed in the connection box exceeds 120 W, the housing can heat up to over 60 °C.

Touching the connection box can cause burns.

Therefore:

- DO NOT run High Voltage through the Single Flat Panel Suspension. SFP is designed for low voltage and power bricks shall be mounted in the ceiling and low voltage run through SFP.



WARNING!

Use of non-EMC flat screens and switched-mode power supplies is life threatening.

Radiation disturbances can skew measurement results of medical devices (e.g., monitoring of vital functions). This can result in life-threatening situations.

Therefore:

- Use only UL- or IEC-rated (UL60601-1, IEC 60601-1) flat screens and switched-mode power supplies.

5.4 Initial start-up

Before the operator begins using the surgical light, BERCHTOLD or an authorized BERCHTOLD representative must first:

- Perform an on-site function test on the light
- Train those responsible for the lighting system, using this operating manual.

6 Operation

6.1 Safety

Observe the following safety instructions when operating the light.

Basic information



WARNING!

Risk of injury due to improper operation!

Improper operation can cause severe injury or damage.
Therefore:

- Perform all operating steps as specified in this operating manual.

Glare



CAUTION!

Risk of improper operation due to impaired vision!

The high light intensity poses a risk of temporary glare.
This can impair safe handling of instruments and devices as well as spatial orientation.

Therefore:

- Never look directly into the surgical light when switched on.
- Do not place sizable reflective objects in the beam path.

Collision



WARNING!

Risk of contamination of the surgical field from splintering parts!

If the light heads collide with the support arms or with fixtures/ walls, paint chips or plastic fragments can break off and contaminate the surgical field.

Therefore:

- Avoid collisions.
- Exercise caution when moving the light heads and support arms.

Heating

Loss of stability



CAUTION! **Damage from collision!**

If light heads and support arms collide with each other or against fixtures/ walls, the surgical lights can be damaged.

Therefore:

- Avoid collisions.
- Exercise caution when moving the light heads and support arms.



WARNING! **Risk of tissue necrosis from heating of the surgical field!**

If the multiple light fields overlap or if the light is too close to the surgical field, the surgical field can overheat. This can cause the tissue to heat up and dry out, and even result in necrosis following excessive exposure.

Therefore:

- Operate the surgical light only if lens is intact.
- Make sure there is sufficient distance between the light and the surgical field.
- Be aware of any heat build-up in the surgical field and rearrange the surgical lights as necessary.



WARNING! **Risk of contamination of the surgical field through loss of stability of the lighting system!**

Do not attach any objects to the light head or support arms; this can make the light system unstable and damage the mechanics, thereby compromising safe positioning. Objects can come loose and fall into the surgical field.

Therefore:

- Do not attach objects to the light head.
- Do not hang objects on the light head or the support arms.

Heat accumulation



CAUTION!

Damage from overheating if light head is covered!

If the light head is covered with fabric while in operation, heat cannot be dispersed to the ambient air as needed. This can cause overheating and damage the surgical light.

Therefore:

- Never cover the light head while in operation.

6.2 Function Tests Before Each Use

The following tests should be performed before each use to ensure the CHROMOPHARE® light is working properly and in good condition.

1. Switch on the light.

Make sure that the light is being emitted from the LED module(s) in combination lights.

2. Visually inspect the head and suspension.



WARNING!

Risk of contamination of the surgical field from damaged head and/or suspension!

Materials can break off damaged or broken lens and contaminate the surgical field.

Therefore:

- If the head or suspension is damaged switch the light off immediately and do not use again until the defect has been rectified.

3. Check the keypad panel.

Press the buttons to check each function.

4. Check the mechanical movement.

Swivel and rotate all the joints and arms to verify the movement apparatus is working properly. They must be easy to move in any direction.

6.3 Control Panel CHROMOPHARE® E 778, E 668 and E 558

The keypad on the wall and optional cardanic control contains the following elements for controlling and displaying light functions:

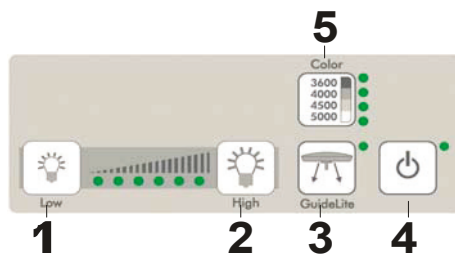


Fig. 41 LED control panel

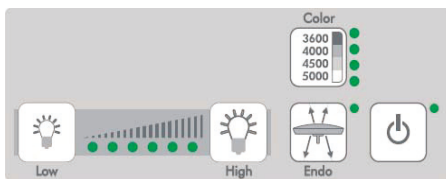
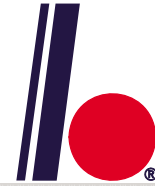


Fig. 42 LED Control panel, w/ENDO

Button	Function	
Darker	Press and hold	Continually lowers intensity
	Press briefly	Lowers intensity incrementally
Brighter	Press and hold	Continuously increases intensity
	Press briefly	Increases intensity incrementally
EndoLite™ ON/OFF	Toggle between surgical field lighting and upward/downward ambient surround lighting.	
ON/Standby	Switch light on or to standby mode	
Color Select	Press and hold	Changes color intensity
Display	Function	
Brighter/Darker	Displays percentage levels from 50% to 100% intensity.	
GuideLite™ / EndoLite™	Lights up green when GuideLite™ mode is activated.	
ON/Standby	Slowly flashing green light when the surgical light is in standby mode	
	Solid green light when the surgical light is switched on.	
Color Select	Displays the selected color temperature mode. Switch among color temperatures 3600 K, 4000 K, 4500 K and 5000 K.	



NOTE!

Special operating characteristics must be recognized with GuideLite™ and the Color Select option (⇒ GuideLite™, ⇒ Color Select option).



NOTE!

If the GuideLite™ ambient lighting is selected, the intensity of the downward ambient lighting is always 5% of the residual brightness.

However, the intensity can be increased to 10% by pressing the Brighter button and reduced again to 5% by pressing the Darker button.



NOTE!

The Color Select button has to be pressed for 2 seconds in order to switch to the next color temperature phase.



NOTE!

If the surgical light is switched on again from the Standby as well as the GuideLite™ or ENDO mode, the most recently selected color temperature is set.

GuideLite™

What is the **GuideLite™**?

The CHROMOPHARE® E 778, E 668 and E 558 surgical lights are equipped with GuideLite™ downward lighting for Endoscopic operations. Room lighting is often dimmed during Endoscopic surgeries to reduce glare and facilitate monitor viewing. Surround lighting is achieved by dimming all other lighting to approx. 5% or 10% residual brightness.



NOTE!

If the GuideLite™ ambient lighting is selected, the intensity of the ambient lighting is always 5% of the residual brightness.

However, the intensity can be increased to 10% by pressing the Brighter button and reduced again to 5% by pressing the Darker button (⇒ Keypad).

Operation

Use the control panel to switch from surgical site lighting to GuideLite™ (⇒ Keypad).



NOTE!

When GuideLite™ surround lighting is selected, all lights in the combination are switched to GuideLite™ mode.

When GuideLite™ is switched off again by pressing the GuideLite™ ON/OFF button(⇒ Operation), all lights are returned to their previous mode.

If the surgical site lighting is again selected by pressing the ON/Standby mode, the corresponding lights will restore the surgical site lighting.

All other lights in the combination remain in standby mode.



Single and combination lights CHROMOPHARE® E 778, E 668, E 558

Operation

EndoLite™

What is the EndoLite™?

The CHROMOPHARE® E 778, E 668 and E 558 surgical lights can be equipped with EndoLite™ surround lighting for Endoscopic operations. Room lighting is often dimmed during Endoscopic surgeries to reduce glare and facilitate monitor viewing. EndoLite™ is achieved by dimming all other downward directed lighting to approx. 5% or 10% residual brightness and engaging an upward directed surround lighting.



NOTE!

If the EndoLite™ ambient lighting is selected, the intensity of the downward directed ambient lighting is always 5% of the residual brightness.

However, the intensity can be increased to 10% by pressing the Brighter button and reduced again to 5% by pressing the Darker button (⇒ Keypad).

Operation

Use the control panel to switch from surgical site lighting to EndoLite™ ⇒ Keypad).



NOTE!

When EndoLite™ surround lighting is selected, all lights in the combination are switched to GuideLite™ mode.

When EndoLite™ is switched off again by pressing the EndoLite™ ON/OFF button(⇒ Operation), all lights are returned to their previous mode.

If the surgical site lighting is again selected by pressing the ON/Standby mode, the corresponding lights will restore the surgical site lighting.

All other lights in the combination remain in standby mode.



Color Select Description

Changing the color temperature allows tissue structures to be seen in greater contrast.

Installation and operation

Color temperature is changed on the keypad (⇒ *Keypads*).



NOTE!

If the surgical light is switched on again from either standby mode or GuideLite™ mode, the most recently selected color temperature is selected.



NOTE!

It is not possible to select different color temperatures within a multi-light configuration.



NOTE!

*The Color Select button has to be pressed for 2 seconds in order to switch to the next color temperature phase (⇒ *Keypad*).*

6.4 Sterile Handle Changing the sterile handle



Fig. 43 Sterile Handle

Use the central handle only if a sterile handle is installed. The sterile handle is required for safe, hygienic operation.

1. Press the unlock button on the sterile handle.
2. Remove the handle from the holder.
3. Push a freshly sterilized handle onto the handle adaptor until it is firmly seated, with the bottom flange within ¼" of the base ring.
4. Turn the sterile handle clockwise until it clicks into place.

6.5 Light Field Size

Adjusting the size of the light field



Fig. 44 Adjusting the field size

The size of the light field, turn the sterile handle.

- Turn the handle clockwise to enlarge the field.
- Turn the handle counterclockwise to shrink the field.

Note: If an in-light camera is installed, field size adjustment will take place at the camera control unit, not the sterile handle.

Notes on adjusting the light field

The surgeon determines the optimal size of the light field based on the size of the incision.

For optimal contrast, the light field should be about .5"inch or 1 cm larger than the incision and illuminate the edge of the sterile drape. This accelerates ocular adoption and makes it easier for the surgeon to visualize the entire surgical site.

6.6 ChromoVision® Camera System Option

Options

The CHROMOPHARE® E 778, E 668 and E 558 lights can be equipped with the BERCHTOLD ChromoVision® camera system.

Description

The ChromoVision® camera system enables the procedure to be transmitted and recorded for teaching and documentation purposes. The ChromoVision® camera system has a camera integrated into the center handgrip of the light.

Installation and operation

Installing and operating the ChromoVision® camera systems are described in a separate installation and operating manual.

6.7 ChromoView™ Monitor Support Arms

Options

ChromoView™ monitor support arms on all single and combination CHROMOPHARE® E generation lights can be added at time of manufacturing.

Description

The single-monitor support arms were specially designed for mounting 15" - 26" flat screens.

Thanks to the VESA connection for the adapter plate, the pivot point is at the center of gravity of the flat screen. This minimizes the danger of tipping; it also allows the flat screen to be tilted without a great deal of effort.

The especially high capacity cable channel on the arms accommodates multiple high-quality video signal bundles. The ChromoView™ monitor support arms can be rotated 320°.

The single-monitor support arm can handle up to 10 kg.

The dual-monitor support arm can handle up to 26 kg.

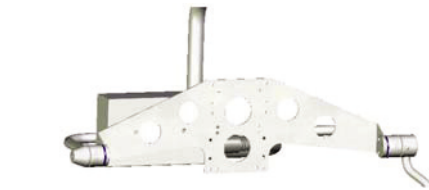


Fig. 45 Single-monitor support arm



Fig. 46 Dual-monitor support arm

Technical data, part order numbers

Single-monitor support arm:

Specifications	Value	Unit
VESA connection adapter plate	75 x 75 & 100 x 100	mm
Capacity	12-22 / 5.5–10	lbs / kg
Width	max. 26.75	inches

Part order no. CT 0600604: Support arm, rotatable 320°

Part order no. CT 0600704: Support arm, rotatable 360°

Dual-monitor support arm:

Specifications	Value	Unit
VESA connection adapter plate	75 x 75 & 100 x 100	mm
Capacity (depending on model)	3.3-51.8 / 1.5–23.5	lbs / kg
Width	36.2-46.3	in

Part order no. CT 0604104: Support arm capacity 1.5 – 17.5 kg.

Part order no. CT 0604004: Support arm capacity 17 - 23.5 kg.

Installation

Follow instructions provided under Installation and initial start-up.

Operation

To operate and adjust the ChromoView™ monitor support arms, follow the same operating instructions as for the surgical lights.

6.8 Wall Control Unit

Options

This can be configured either as a stand-alone installation, or integrated into a wall mount SK box. Wall Controls are the standard configuration for BERCHTOLD lights.

Description

In the wall control unit, the lights are operated from a central touchpad mounted on the wall.

Wall control units are available as either in-wall or surface-mounted units. The in-wall model can also be used for easier integration into the panel.

6.9 Communication interface option

Options

A communication interface can be integrated into a wall control unit at point of sale or a later time.

Description

The communication interface allows the combination light to be controlled by remote and displays the operating status of the surgical lights.

Operation

Operation is controlled by a local BERCHTOLD approved control system; see your Sales Consultant for details.

6.10 Notes on Positioning the Surgical Lights

Before the surgery, move the light head to an accessible position where it can be easily adjusted later.

For single lights:

1. Position the light head in the center of the surgical site by guiding it along the rail (position it in the center of the surgical field (⇒ 99: Positioning a single light)). The recommended distance from the light to the operating table is 1.15 m.



NOTE!

The distance between the surgery light surface from which light is emitted and the patient must not be less than 24 in. / 60 cm. Maintaining a minimum distance of 24 in. / 60 cm is the only way to ensure functional and consistent illumination.

2. Initially position the light so the light head can be repositioned with minimal effort and the control panel is easy for scrub personnel (circulator) to access to adjust the intensity.
3. Using the sterilizable handle sleeve on the center grip, the surgeon adjusts the light as needed.

If using combination lights, also note the following:

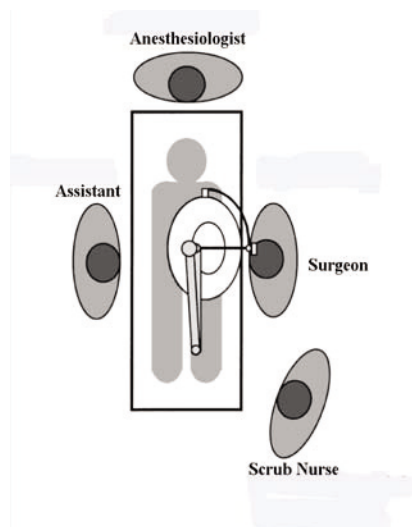


Fig. 47 Positioning a single light

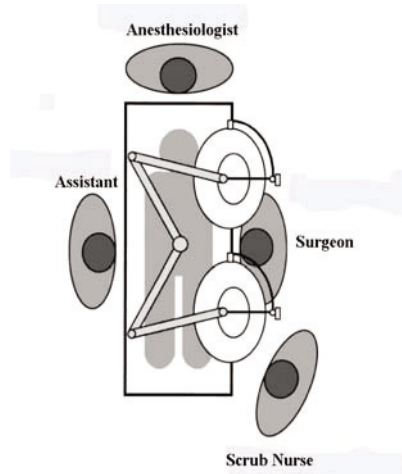


Fig. 48 Positioning combination lights

For double combination lights:

1. Position the light heads so that the light fields of all lights provide an equal area of coverage.



NOTE!

Keep in mind that maximum light intensity can raise the temperature of the surgical site, causing the tissue to heat up and dry out.

2. Position the main light in the center of the surgical field and the supplementary light towards the feet.
3. Move the swivel and spring arms into their initial position (⇒ 48: Positioning combination lights). Both light heads should then be easy to move with minimal effort. The control panels of both light heads should be easy for scrub personnel (circulator) to access to adjust the intensity.
4. For surgeries involving two intervention sites (e.g., a bypass), position one light over each site.

If using combination lights, also note the following:

For triple combination lights:

1. Position the light heads so that the light fields of all lights provide an equal area of coverage.



NOTE!

Keep in mind that maximum light intensity can raise the temperature of the surgical site, causing the tissue to heat up and dry out.

2. Position the main light in the center of the surgical field and the supplementary light towards the feet.
3. Move the swivel and spring arms into their initial position (⇒ 49: Positioning combination lights). Both light heads should then be easy to move with minimal effort. The control panels of both light heads should be easy for scrub personnel (circulator) to access to adjust the intensity.
4. For surgeries involving two intervention sites (e.g., a bypass), position one light over each site.

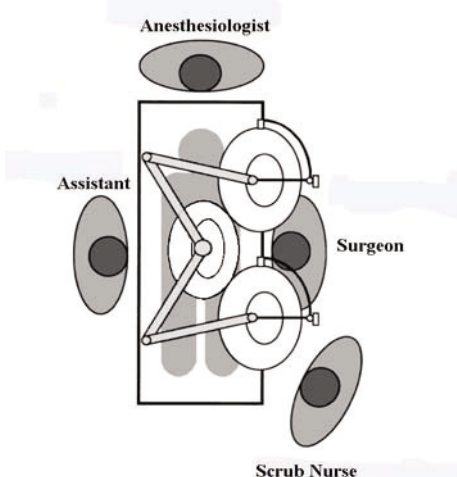


Fig. 49 Positioning combination lights

7 Malfunctions

If malfunctions occur more and more frequently, shorten the maintenance intervals (⇒ Maintenance schedule) according to the actual use of the equipment.

For malfunctions that cannot be rectified by the following instructions, contact Technical Service 1-800-243-5135 Opt. 2.

7.1 Rectifying malfunctions

Have only the BERCHTOLD service group assist you.

- 1.** Notify BERCHTOLD service 1-800-243-5135 Opt. 2.
- 2.** Remove the surgical light from service until it can be repaired, particularly if it does not provide the full functionality needed for use in the OR.

8 Maintenance and inspection

8.1 Safety

Personnel

- Unless otherwise indicated, the maintenance tasks described here are performed by the operator.
- Some maintenance work may be done only by specially trained technicians or the manufacturer; these tasks are marked accordingly.
- Only licensed electricians may perform any electrical work.

Personal protective equipment



NOTE!

The individual warning notices in this section indicate the protective equipment to be worn for each task.

Basic information



WARNING!

Risk of injury due to improperly performed maintenance!

Improper maintenance can cause severe injury or damage.

Therefore:

- Before beginning installation, ensure there is adequate space.
- If components are removed, be sure to note the correct installation; correctly reinstall all fasteners and observe correct torques.

8.2 Cleaning, disinfection and sterilization

General cleaning and disinfection

The cleaning and disinfection of the operating light shall only be made by a hygiene specialist or the person who is instructed by the hygiene specialist.

Only chemicals, which have been tested in terms of material compatibility and released by BERCHTOLD, shall be used. Special care is necessary for the choice of the chemical product as well as their concentration.

If the current list, which is on the BERCHTOLD website and available on request (⇒ back side of cover), does not include a disinfectant or detergent, it shall not be used, since functional components can be modified or damaged.



NOTE!

Any warranty claim terminates when these guidelines are ignored.



NOTE!

Current recommendations:

■ *Surface disinfectants and detergents for manual preparation.*

■ *Disinfectants and detergents for automatic preparation can be viewed on the internet and are available on request (⇒ back side of cover).*

Recommended cleaners and disinfectants



NOTE!

The operator should refer to recognized standards for hygiene and disinfection.

Wet disinfection instructions for support system, light head and wall control unit

When cleaning, only a thin liquid film may be applied.

After wiping, a thin, coherent, moisturizing film is - from the perspective of microbiological efficiency - sufficient; the surface does not have to be "drenched".

In order to prevent a build-up of disinfectant material, clean regularly with a mild all-purpose cleaner.

Regularity depends on the frequency of the treatment. We recommend that cleansing be performed at least once a month.

Clean the surgical lights with a damp cloth only, not a wet cloth.



CAUTION!

Improper use of disinfection products can lead to product damage!

Not following or adhering to the information and instructions in this chapter can result in product damage!

It also voids any warranty claims!

Therefore:

- When cleaning and disinfecting, make sure that no liquid penetrates the light head or support system components.
- The surface disinfectants may only be used in the concentration prescribed by the manufacturer.
- The use of NATRONLAUGE can cause surface changes on coated aluminum components and impair the service life of the product.
- If the surface disinfectant is used incorrectly, such that a large amount of liquid remains on the surface, it will cause increased coating dissolution because the product is continually "shifted" around the surface but never removed. In case of an increased layer composition of surface disinfectant, it must be thoroughly cleansed.



- Due to possible damage to the materials, no solutions are suitable that are based on halogen-splitting bonds, strong organic acids and oxygen-splitting bonds, solvents, fuel or other.
- In order to avoid damages to the stainless steel parts, only use disinfectants without chlorides or halogenoids.
- Avoid contact between aldehyde and amino products. Therefore, especially if an amino-based product was used previously, before applying the aldehyde-based disinfectant for the first time, an intermediate cleaning step has to be performed. This is very important because disregarding this step may result in residue no longer being able to be removed.
- With regard to the microbiological effectiveness, please contact the manufacturer of the disinfectant



Single and combination lights CHROMOPHARE® E 778, E 668, E 558

Maintenance & Inspection

Handle sleeves, manual disinfection

Disinfect the handle sleeves as follows:

- Alcohol, QAV or aldehyde-based disinfectant.
- After cleaning, make sure to completely rinse the sleeve with water to remove any residue.



CAUTION!

Incorrect manual disinfection causes product damages!

Not following or adhering to the instructions listed can result in product damage!

It also voids any warranty claims!

Therefore:

- Avoid dipping in enzyme-based cleaner for long periods.

Handle sleeves thermal preparation

The handle sleeves are made of heat- and impact-resistant plastic.

Prepare the handle sleeves as follows:

- Use alkaline-based cleaner without active chlorine
- Neutralize with acidic neutralizer

The handle sleeves can be machine cleaned via thermo disinfection at temperatures of up to 200°F/93° C for 10 minutes.

Handle sleeves, sterilizing

Clean and disinfect handle sleeves in the usual way before sterilization.

Immerse each soiled handle for 5 minutes in a enzymatic surgical detergent, suitable for cleaning surgical instruments, follow detergent instructions

Rinse handle in a brisk stream of clean tap water (22°C-43°C) sufficiently to remove all residue/debris and cleaning agents.

Examine handle for any signs of residue/debris or damage and wipe dry with a soft gauze cloth.

The handle sleeves are placed in a suitable sterilization packaging (one-time sterilization packaging, e.g. film/paper sterilization bags; single or double packaging) and sterilized.

The handle sleeves can be steam sterilized. The recommended parameters per AAMI 11134 are:

132°C at 33.3 psi for 4 minutes for pre-vacuum cycle

121°C at 18.9 psi for 25-30 minutes for steam sterilization cycle

When loading the autoclave, make sure the open end of the sleeve is pointing down. Allow sufficient space around each handle sleeve and do not allow them to come in contact with any other items being sterilized.





CAUTION!

Incorrect use of disinfectants can cause product damages!

Not following or adhering to the instructions listed can result in product damage!

It also voids any warranty claims!

Therefore:

- Hot air, ethylene oxide, formaldehyde and low-temperature plasma sterilization are not permitted.



CAUTION!

Limited warranty on handles!

Sterilizable handles are subject to natural wear.

Therefore:

- It must be pointed out that a normal lifetime of approx 100 cleaning cycles is possible.
- Damaged handles must not be used.

8.3 Maintenance schedule

The following sections describe the maintenance work required for optimal and trouble-free operation.

If you have any questions on maintenance tasks and intervals, contact BERCHTOLD (⇒ service address on inside back cover).

Interval	Maintenance task	Who should perform
Daily, before each use	General function tests (⇒ Operation)	Operator
As needed	Changing LED modules	BERCHTOLD authorized trained personnel
As needed	Change on-site mains fuses	Electrical technician
Annually	General maintenance in accordance with maintenance scope	BERCHTOLD authorized trained personnel



8.4 Maintenance

8.4.1 Function tests before each use

- To be completed by the operator.

Each day, before using the CHROMOPHARE® lights, perform the function tests described at the beginning of the Operation section (⇒ Operation).

8.4.2 Replacing LED modules

- Performed by BERCHTOLD or a company authorized by BERCHTOLD.



CAUTION!

Property damage due to unauthorized replacement of LED modules!

If defective LED modules are replaced by insufficiently qualified persons, significant damage to property can result.

Any and all warranty claims will also be invalidated

Therefore:

- LED modules may only be replaced by BERCHTOLD or a company authorized by BERCHTOLD.

8.4.3 Replacing (on-site) fuses

- To be performed only by a skilled electrician.



DANGER!

Risk of death from electrical current!

Touching live electrical components is life threatening. Damage to insulation or individual components can cause fatal injury.

Therefore:

- Electrical work is to be performed by skilled electricians only.

Both the mains and emergency power fuses are located in an external control cabinet for easy replacement in the event of failure.

Fuse values are listed in the Appendix.



9 Disassembly

Once the product has reached the end of its service life, it must be disassembled and disposed of in accordance with environmental regulations.

9.1 Safety Personnel

- Disassembly may be performed only by trained, skilled personnel.
- Only skilled electricians may perform electrical work!

Basic information



WARNING!

Risk of injury due to improper disassembly!

Parts still under load, sharp components, points and corners on or in the device or on required tools can cause injury.

Therefore:

- Before beginning any work, make sure there is adequate space.
- Disassemble components properly. Components are heavy -- be careful.
- Secure components from falling or toppling over.
- In cases of doubt, consult with BERCHTOLD.



CAUTION!

Risk of injury from erratically moving parts!

If spring or heavy-duty arms are released while taut, they will move quickly and uncontrollably and possibly cause injury.

Therefore:

- Always keep hold of spring and heavy-duty arms when disassembling the lighting system.
- Avoid putting pressure on spring and heavy-duty arms and releasing them suddenly.

Spring and heavy-duty arms

Electrical equipment



DANGER!

Risk of death from electrical current!

Touching live electrical components is life threatening. Live electrical components can cause erratic movements and result in life-threatening injuries.

Therefore:

- Always turn off the system and completely disconnect it from the electrical power before beginning disassembly.

9.2 Disassembling the system

Before you begin disassembly:

- Turn off the system and secure it against accidental switch-on.
- Disconnect all physical connections between the system and the power supply and allow residual energy to dissipate.
- Remove all operating and auxiliary and other processing materials and dispose of them in accordance with environmental regulations.

Professionally clean all modules and components and dismantle them in accordance with local occupational safety and environmental regulations.

9.3 Disposal

In the event there is no return or disposal agreement, recycle disassembled parts:

- Scrap metals.
- Give plastic items to a recycling facility.
- Sort the other components based on their material properties.



CAUTION!

Incorrect disposal can damage the environment!

Electrical scrap, electronic components, lubricants and other auxiliary materials require special handling and must be disposed of by a professional disposal company.

Contact the local authorities or a special disposal company for information on environmentally safe disposal.

10 Appendix

10.1 Consumables

Item	Part No.
Sterile Handle, standard (1 piece)	CZ 4990604
Sterile Handle, ChromoVision® (1 piece)	CZ 4990704

10.2 Fuses, terminal voltages

Fuses

Fuses must be supplied by the owner (all fuses 250VAC-8 Amp Buss).



NOTE!

Fuses must be UL and IEC 60127 approved.

Terminal voltages

The terminal voltages cited in the following table must be measured on the ceiling tube of CHROMOPHARE® surgical lights:

AC	DC
21.5 V (upstream filtering board)	24 (+ 1.5/- 0.3) V

10.3 Information on electromagnetic compatibility (EMC)

Electrical medical devices such as this are subject to special EMC precautions and must be installed and put into operation in accordance with the instructions in the operating manual.

CHROMOPHARE® surgical lights are designed for use in the electromagnetic environment specified below. The operator must ensure that the lights are used only in this environment.

10.3.1 Guidelines and manufacturer's declaration – Electromagnetic emissions

Emissions test	Compliance	Electromagnetic environment – Guidelines
RF emissions per CISPR11	Group 1	CHROMOPHARE® lights use RF energy only for internal functioning. Therefore, their RF emissions are very low and not likely to cause any interference in nearby electronic equipment.
RF emissions per CISPR11	Class B	CHROMOPHARE® lights are suitable for use in all facilities, including residential areas and those directly connected to the public power grid that supplies residential buildings.
Harmonic emissions per IEC 61000-3-2	Class A	
Voltage fluctuations	Fulfilled	

10.3.2 Guidelines and manufacturer's declaration – Electromagnetic interference immunity

Immunity tests	IEC 60601 test/compliance level	Electromagnetic environment – Guidelines
Electrostatic discharge (ESD) per IEC 61000-4-2	± 6 kV contact discharge	Synthetic floors should be antistatic and the relative humidity at least 30%.
	± 8 kV air discharge	
Electrical fast transient bursts per IEC IEC 61000-4-4	± 2 kV for power supply lines	The mains power quality should correspond to that of a typical commercial or hospital environment.
	± 1 kV for input and output lines	
Surges per IEC 61000-4-5	± 1 kV normal mode voltage	The mains power quality should correspond to that of a typical commercial or hospital environment.
	± 2 kV common mode voltage	
Voltage dips, short interruptions and fluctuations in the power supply voltage per IEC 61000-4-11 (U _T : AC mains voltage prior to application of test levels)	< 5% U _T for ½ cycle (> 95% dip)	The mains power quality should correspond to that of a typical commercial or hospital environment. To ensure continuous operation of the CHROMOPHARE® lights, they must be connected to an uninterruptible power supply in accordance with DIN VDE 0100-710.
	40 % U _T for 5 cycles (60% dip)	
	70% U _T for 25 cycles (30 % dip)	
	< 5% U _T for 5 s (> 95% dip)	
Radiated RF fields per IEC 61000-4-3	3 V/m, 80 MHz to 2.5 GHz	For image distortion in lights with a built-in camera system, move the source of the electric fields further away from the lights or install shielding.

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For more than 85 years, BERCHTOLD has been one of the world's leading developers and manufacturers of high-quality surgical equipment. As a specialist for OR equipment, we offer best-in-class products, many years of experience in planning and project management, as well as personalized service. We measure our success by the quality of our relationships with customers and employees.

Our products and services

- CHROMOPHARE[®] surgical and examination lights
- ChromoVision[®] camera systems
- ChromoView[™] monitor arms
- TELETOM[®] ceiling-mounted systems
- OPERON[®] surgical tables and accessories
- ORICS[®] telemedicine
- SUPERSUITE[®] custom-designed OR solutions
- 3D-OR[™] Design Software
- Service and installation by our own trained specialists
- Development, consulting, project management and customer support

We look forward to hearing from you and would be happy to help you with the planning, design, and installation of your next OR suite.



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